The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A device for locating a series arc fault at one or more series connections having a first end and a second end, the first end of the connections being coupled to a source of common-mode voltage and the second end of the connections being coupled to a wire, the wire having a conductive layer and an insulation layer for sheathing the conductive layer, the device comprising:

an electrode electrically coupled to the source of common-mode voltage at a first node, thereby providing a reference based on the common-mode voltage;

a probe adapted for clamping to the wire at a second node, thereby forming a coupling capacitance to electrically couple the probe to the wire; and

a measuring circuit being coupled to the probe and being coupled to the electrode so as to measure an AC voltage between the first node and the second node to detect and locate the series arc fault.

2. The device of Claim 1, wherein the probe includes a first conductive layer and wherein the coupling capacitance electrically couples the first conductive layer of the probe to the conductive layer of the wire.

3. The device of Claim 2, wherein the probe includes a second conductive layer and a first insulation layer, the first insulation of the probe being interposed between the second conductive layer of the probe and the first conductive layer of the probe, the second conductive layer being defined as a probe shield for shielding the first conductive layer of the probe from parasitic capacitance.

4. The device of Claim 3, wherein the device includes a compensator for driving the probe shield with a guard voltage, the guard voltage having a level being nearly equal to the measured AC voltage, and thereby compensating for the undesired capacitance produced by the second conductive layer.

5. The device of Claim 1, wherein the device includes a compensator for measuring an offset voltage that causes error in the measured AC voltage, the second

compensator being adapted to normalize the measured AC voltage based on the offset voltage.

6. The device of Claim 1, wherein the device includes a circuit means to measure the high-frequency noise produced by the series arc fault.

7. The device of Claim 1, wherein the probe is encased in a nonconductive material to protect a user from electric shocks.

8. The device of Claim 1, wherein the amplifier is housed in a chamber acting as an electrostatic shield, the chamber being electrically coupled to the electrode.

9. The device of Claim 1, wherein the measuring circuit includes an amplifier having a high impedance to inhibit the measured AC voltage from changing significantly when the coupling capacitance changes.

10. The device of Claim 1, wherein the coupling capacitance is greater than about 1 picofarads and less than about 10 picofarads.

11. A probe for locating a series arc fault at a connection, the connection being adapted to electrically couple one portion of a circuit to another portion of the circuit, the probe comprising:

a capacitive sensor to sense a voltage, which is defined as a sensed voltage, on a wire where the probe is clamped, the wire being electrically coupled to one portion of the circuit;

a current sensor to sense current, which is defined as sensed current, in the circuit by magnetically coupling to the circuit;

a user interface device having a display and an input device; and

a controller having a microprocessor, which is adapted to run software to process the sensed voltage and the sensed current to produce information and provide this information to the display of the user interface device.

12. The probe of Claim 11, wherein the software includes code that compensates for an offset voltage produced by stray capacitance, the software being

adapted to record the sensed voltage when the sensed current is substantially zero, and being further adapted to substract the sensed voltage from other sensed voltages when the sensed current is not substantially zero.

13. The probe of Claim 11, wherein the software includes code to calculate the power dissipated in the connection.

14. The probe of Claim 11, wherein the software includes code to calculate the resistance of the connection.

15. The probe of Claim 11, further comprising a circuit means to detect high frequency noise through a capacitive sensor.

16. The probe of Claim 15, wherein the software includes code to determine when electrical arcing is present based on the level of high frequency noise exceeding a predetermined threshold.

17. The probe of Claim 15, wherein the software includes code for determining and recording an event associated with the presence of electrical arcing.

18. A device for locating a series arc fault at one or more series connections having a first end and a second end, the second end of the connections being coupled to a wire, the wire having a conductive layer and an outer insulation layer for sheathing the conductive layer, the device comprising:

a capacitive probe for clamping to the outer insulation layer of the wire to sense a voltage at the second end of the connections; and

a floating high-impedance meter having a ground reference electrically coupled to the first end of the connections, the floating high-impedance meter being adapted to measure a voltage sensed by the capacitive probe and being further adapted to indicate the presence of the series arc fault when the measured voltage exceeds a predetermined level.

19. The device of Claim 18, further comprising a display being coupled to the floating high-impedance meter.

20. The device of Claim 18, wherein the first end of the connections is connected to a power source.

21. The device of Claim 18, wherein the first end of the connection is connected to the airframe.

22. A device for locating a series arc fault at one or more series connections having a first end and a second end, the first end of the connections being electrically coupled to an AC voltage source and the second end of the connections being electrically coupled to a wire, the wire having a conductive layer and an outer insulation layer for sheathing the conductive layer, the device comprising:

a high-impedance amplifier having an input terminal being coupled to a first node, and an output terminal being coupled to a second node node;

an input resistance having a first terminal coupled to the first node and a second terminal coupled to ground;

a capacitive probe coupled to the first node and being adapted to clamp to the outer insulation layer of the wire;

a user interface device including a displayand signal processing circuits for receiving and processing a voltage at the second node ; and

an electrostatic shield coupled to ground and for encasing the high-impedance amplifier, the capacitive probe, and the user interface device, the electrostatic shield being adapted to expose the display of the user interface device and a portion of the capacitive probe.

23. The device of Claim 22, wherein the electrostatic shield is coupled to the AC voltage source.

24. The device of Claim 22, wherein the AC voltage source is zero volts.

25. The device of Claim 22, wherein the device is a handheld instrument being powered by a battery.

26. A probe for locating a series arc fault at a connection, the connection being adapted to electrically couple one portion of a circuit to another portion of the circuit, the

one portion of the circuit including a wire having a conductive layer and an outer insulation layer for sheathing the conductive layer, the probe comprising:

jaws being composed of one or more opposable parts that open and close for clamping on to the wire, each part having a flexible first conductive layer for capacitively coupling through the outer insulation layer of the wire to detect a voltage on the wire, a second conductive layer for acting as an electrostatic shield, and a first insulation layer interposing between the first conductive layer and the second conductive layer to isolate the first conductive layer from the second conductive layer;

a first elongated member being integral to one part of the jaws; and

a second elongated member being integral to another part of the jaws and further being hingedly coupled to the first elongated member such that the jaws are open when the first elongated member is forced toward the second elongated member, the second elongated member being adapted to house an amplifier circuitry to amplify the detected voltage so as to determine the existence and location of the series arc fault.

27. The probe of Claim 26, wherein the flexible first conductive layer of the jaws includes a soft conductive polymer foam.

28. The probe of Claim 26, wherein the flexible first conductive layer of the jaws includes a conductive metal mesh.

29. A device for locating a series arc fault at one or more electrical connections having a first end and a second end, the first end of the electrical connections being coupled to a source of common-mode voltage and the second end of the electrical connections being coupled to a wire, the wire having a conductive layer and an outer insulation layer for sheathing the conductive layer, the device having a circuit common, the device comprising:

a microprocessor controller;

means for coupling the source of common-mode voltage to the circuit common; and

a probe for clamping on to the outer insulation layer of the wire and further being comprised of current sensor circuitry for providing the instantaneous current flowing in

the wire to the microprocessor controller and being further comprised of capacitive sensor circuitry for providing the instantaneous voltage over the electrical connection to the microprocessor controller.

30. The device of Claim 29, wherein the current sensor circuitry includes an amplifier being receptive to the instantaneous current to produce an amplified instantaneous current, the current sensor circuitry further including signal condition circuits for receiving the amplified instantaneous current to produce a voltage proportional to the amplified instantaneous current, which is presented to the microprocessor controller.

31. The device of Claim 30, wherein the current sensor circuitry includes a current sensor being selected from a group consisting of a Hall-effect sensor, a split-core magnetic current transformer, and a combination of a split-core magnetic loop with a Hall-effect transducer interposed within the magnetic path.

32. The device of Claim 29, wherein the capacitive sensor circuitry includes an amplifier being receptive to the instantaneous voltage to produce an amplified instantaneous voltage, the capacitive sensor circuitry further including signal processing circuits for receiving the amplified instantaneous voltage to produce a voltage proportional to the amplified instantaneous voltage, which is presented to the microprocessor controller.

33. The device of Claim 32, further comprising a high-frequency detection circuit for detecting the presence of the series arc fault, the high-frequency detection circuit being receptive to the amplified instantaneous voltage for producing a voltage indicative of the presence of the series arc fault, which is presented to the microprocessor controller.

34. The device of Claim 29, further comprising a user interface device being adapted to receive input from a user, being adapted to display information from the microprocessor controller, and being further adapted to selectively separate from the device to enhance the viewing of the user.